

52

Date: Thursday, 11/29/2007 11:11:03 AM  
 User: Kim Johnston

## Process Sheet

Customer	CU-DAR001 Dart Helicopters Services			Drawing Name	HIGH AFT X-TUBE 412		
Job Number	36062			Part Number	D412664203		
Estimate Number	10559			Drawing Number	D412-664-243 REV D		
P.O. Number				Project Number	N/A		
This Issue	11/29/2007	S.O. No.		Drawing Revision	D		
Prsht Rev.	NC			Material			
First Issue	/ /	Type	LANDING GEAR	Due Date	12/24/2007	Qty:	1 Um: Each
Previous Run	36061						
Written By	<u>11/29/2007</u>						
Checked & Approved By	<u>11/29/2007</u>						
Comment	Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM						

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :	
1.0	DC	DOCUMENT CONTROL	
		Comment: DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006	<u>J.F. 07/12/16</u>
2.0	D6009129	Crosstube Material	
		Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) Pick: Qty Part number Description Batch 1 D6009-129 Crosstube <u>B.30.306</u> Check OD = 3.500"; ID = 2.250"	<u>J.F. 07/12/16</u>
3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE	
		Comment: MORI SEIKI CNC LATHE LARGE  1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166  2-Turn first side as per Folio FA166  3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243.	<u>J.F. 07/12/16</u>

4.0	QC1	INSPECT ALL DIM TO DIM SHEET	
		Comment: INSPECT ALL DIM TO DIM SHEET	<u>J.F. 07/12/16</u>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 11/29/2007 11:11:03 AM  
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Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

5.0 MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA166

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243.

3- Remove sand and plugs

J.F. 07/12/16 ①

4-Scribe part # and batch # using vibrating stylus as per Dwg D412-664-243

Inside of

Cuff(Donot engrave on outside of tube)

6.0 QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

J.F. 07/12/16 ①

7.0 QC8

SECOND CHECK



Comment: SECOND CHECK

J.F. 07/12/17 ①

8.0 LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

AWM 07-12-18

1-Polish entire outside surface of crosstube

9.0 QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 2-12-18

10.0 HAND FINISHING1

HAND FINISHING RESOURCE #1



AWM 7-12-18

Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

11.0 QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: Inspect work & Chemical conversion Coat

BB 07-12-27

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

12.0 BENDING BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

EL 8-1-3

13.0 QC15 DIMENSIONAL CHECK OF X-TUBES



JUL 01 03 (1)

Comment: DIMENSIONAL CHECK OF X-TUBES

14.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 &amp; DT8551

SR 8-1-4

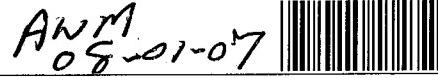
2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 &amp; DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

PH

3-Deburr &amp; Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243

AWM 08-01-07

15.0 HAND FINISHING1 HAND FINISHING RESOURCE #1

RECALL  
POSITIVE

Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

16.0 QC3 INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

08/01/15 (1)

17.0 QC5 INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

08/01/15 EC

18.0 OUTSIDE SERV.10 OUTSIDE SERVICES -LG



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 0380r

Issue P/O: 5434 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

CD 08/01/14 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D412 - 664-203 PAR #: NA Fault Category: Pad Landing Gear NCR: Yes No DQA: D Date: 08/02/22  
 QA: N/C Closed: X Date: 08/02/22

WORK ORDER NON-CONFORMANCE (NCR)								
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08.01.10	143	two large grinding marks were found on the top about 18.5" from center R.C. Human error during	X QSI 042	proceeded to step 19.0 with positive recall. DO NOT PASS until eng. approves the NCR on the tube see below	X N/A	08/01/15 ↓	QSI 042	08.01.11
08.01.10	143	GRINDING TWO DIPS IN TUBE FROM GRINDING SEE ATTACHED EMAIL	CP 08.01.15 per QSI 042	BLEND OUT DIPS. TUBE DIMS ARE STILL ABOVE NOMINAL. SEE ATTACHED EMAIL TUBE ACCEPTABLE.		08/01/15 ↓	CP 08.01.15 per QSI 042	08.01.15

NOTE: Date & initial all entries

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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

19.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.



20.0 QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

21.0 SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

3

PT 08-02-06

2-Paint outside crosstube with White Imron as per QSI 005 4.2

22.0 QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

3 08-02-06

23.0 D3595

Rubber Cushion (per sq ft)



D3595063570 mi 2006 2/19

Comment: Qty.: 0.0492 sf(s)/Unit Total : 0.0492 sf(s)

Rubber Cushion (per sq ft)

.630" x5.70" x2pcs

Batch: 35126

PT 08-02-12

24.0 D2856600

Abrasion Strip



Comment: Qty.: 1.7640 f(s)/Unit Total : 1.7640 f(s)

Pick:

Qty Part number Description Batch

2 D2856-600(Cut to 10.090") Abrasion Strip 36398

PT 08-02-12

25.0 D28961

Support



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D2896-1 Support 33471

PT 08-02-12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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Drawing Name: HIGH AFT X-TUBE 412

Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

26.0 D31891 Chafing Shield



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch  
2 D3189-1 Chafing Shield

36065

*ZT 08-02-12*

27.0 MS2192028 Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch  
4 MS21920-28 Clamp 106864

*ZT 08-02-12*

28.0 MS2192030 clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

clamp(per MIL-DTL-8783C)  
batch: 106810

*ZT 08-02-12*

29.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

Assemble as per Dwg D412-664-203

1-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond Batch: 106695

Expiry Date: 08-11-01

*ZT 08-02-12*

2-Install clamps as per Dwg D212-664-141. Torque clamps to 80-100 in lb.

30.0 QC5 INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

*200814 (4)*

31.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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User: Kim Johnston

**Process Sheet**

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

32.0

AN640A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M106516

AS 08/02/14 (xi)

33.0

AN641A

Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

Batch: M104427

AS 08/02/14 (xi)

34.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

Batch: 106883

AS 08/02/14 (xi)

35.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

Batch: M104374

AS 08/02/14 (xi)

36.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

08/02/15

37.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date  
\*\*\*\*\*

Time &amp; date of packaging: 08/02/15 @ 9:45 AM

Location: \_\_\_\_\_

8/2/15

PPP Rev: \_\_\_\_\_

G

sq

(14)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 11/29/2007 11:11:03 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 36062

Part Number: D412664203

Job Number:



Seq. #: Machine Or Operation:

Description :

38.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

12/28/2008

Job Completion



U 08.02.20

POSITIVE RECALL

EFFECTIVE 08-01-10 AUTH LL

RELEASED 08/01/10 DATE LL

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	36062
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: D		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

First Article     Prototype

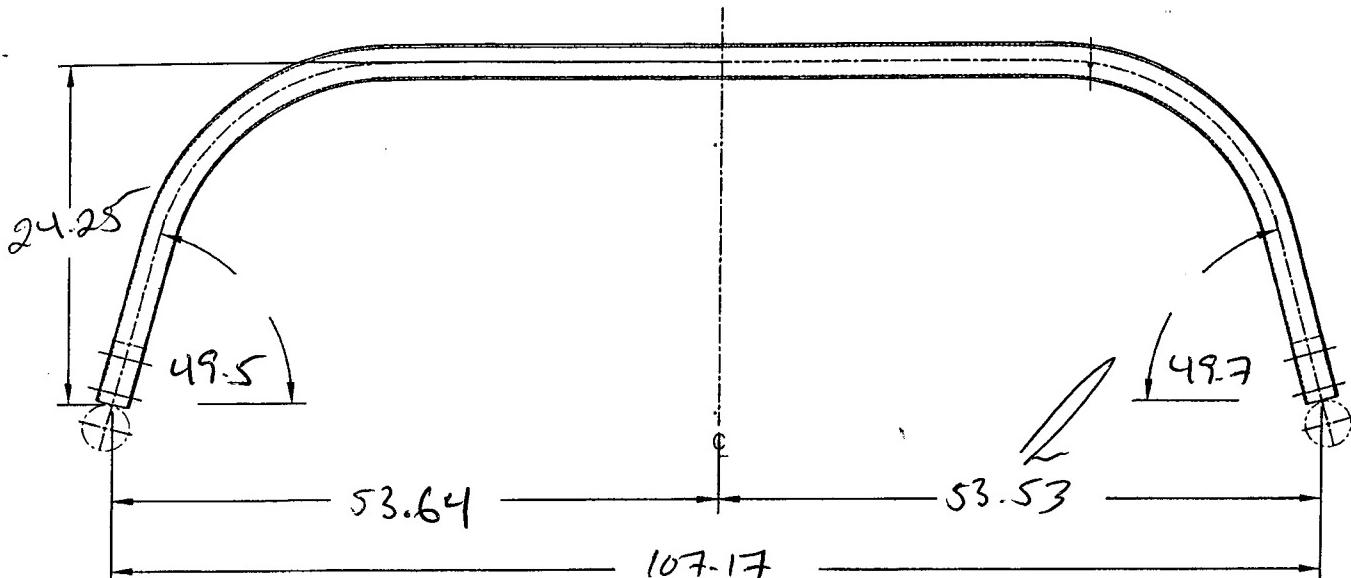
Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.688"	✓		
	2.748	+0.005/-0.000	2.753"	✓		
	2.884	+0.005/-0.000	2.889"	✓		
	3.019	+0.005/-0.000	3.022"	✓		
	3.163	+0.005/-0.000	3.165"	✓		
	3.308	+0.005/-0.000	3.309"	✓		
	3.429	+0.005/-0.000	3.429"	✓		
	2.990	+0.005/-0.000	2.993"	✓		
	2.618	+0.005/-0.000	2.622"	✓		
	0.200	+/-0.010	.200"	✓		
	R0.063	+/-0.010	R0.063"	✓		
	R0.500	+/-0.010	R0.500"	✓		
	4.971	+/-0.030	4.966"	✓		
SIDE B	2.684	+0.005/-0.000	2.688"	✓		
	2.748	+0.005/-0.000	2.753"	✓		
	2.884	+0.005/-0.000	2.888"	✓		
	3.019	+0.005/-0.000	3.022"	✓		
	3.163	+0.005/-0.000	3.164"	✓		
	3.308	+0.005/-0.000	3.309"	✓		
	3.429	+0.005/-0.000	3.429"	✓		
	2.990	+0.005/-0.000	2.993"	✓		
	2.618	+0.005/-0.000	2.622"	✓		
	0.200	+/-0.010	.200"	✓		
	R0.063	+/-0.010	R0.063"	✓		
	R0.500	+/-0.010	R0.500"	✓		
	4.971	+/-0.030	4.959"	✓		
	124.09	+/-0.020	124.090"	✓		

Measured by:	J.F.	Audited by:	8.F.	Prototype Approval:	N/A
Date:	07/12/12	Date:	07/12/12	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	

DART AEROSPACE LTD	Work Order:	36062
Description: Crosstube High Aft (412)	Part Number:	D412-664-203
Inspection Dwg: D412-664-243 Rev: D		Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments

QC15 Inspection	<i>AB.01.03</i>
Date	<i>AB.01.03</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	<i>JM</i>
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM	<i>JL</i>

**DART**

DESIGN <i>PH</i>	DRAWN BY <i>PH</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>GP</i>	APPROVED <i>✓</i>	DRAWING NO. D412-664-243	REV. D SHEET 1 OF 3
DATE 07.03.09		TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE NTS
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30	
D	07.03.09	REMOVE D2732-058, CHANGE TO D3595-063-570	

**RELEASED**07.04.24 *✓*

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
2	D3595-063-570	RUBBER CUSHION
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
2	D3189-1	CHAFING SHIELD
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

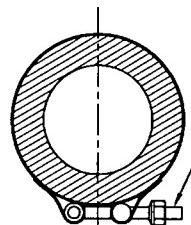
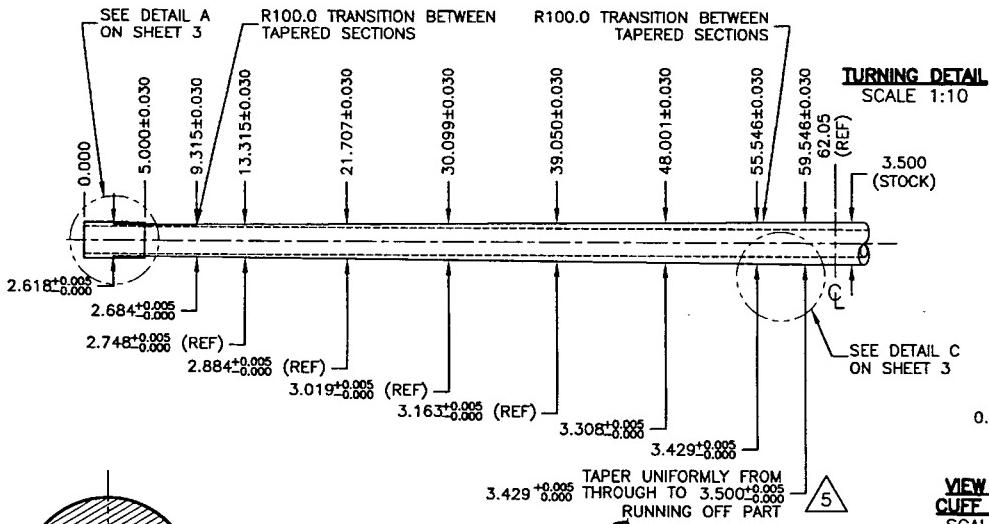
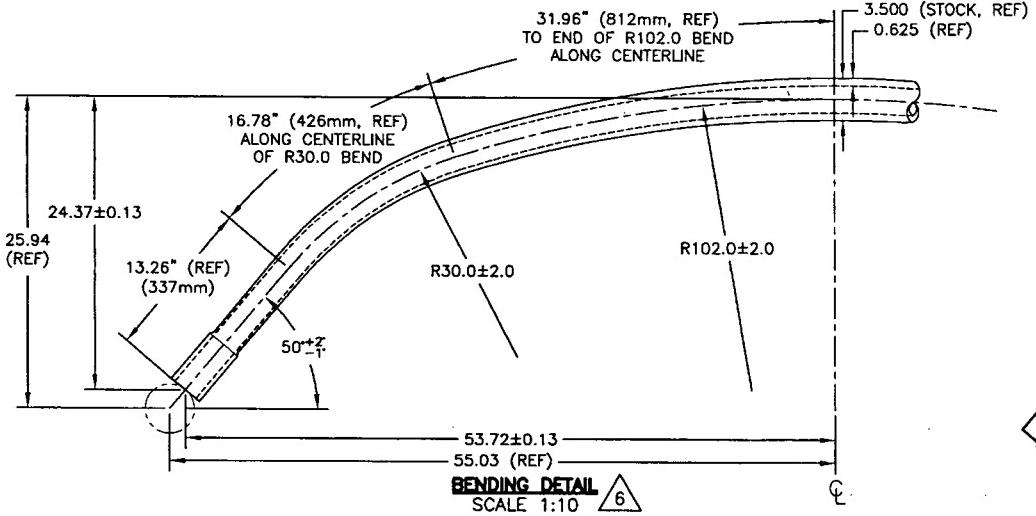
**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH =  $124.09 \pm 0.020$
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. *36062*

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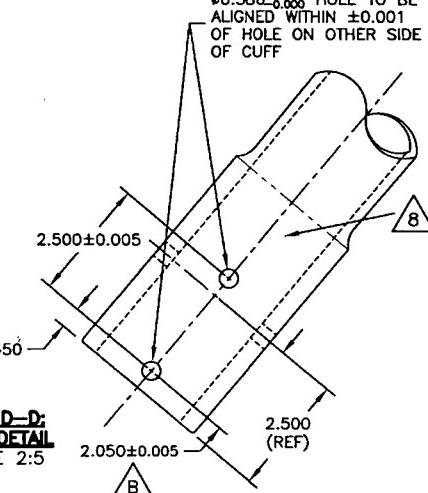
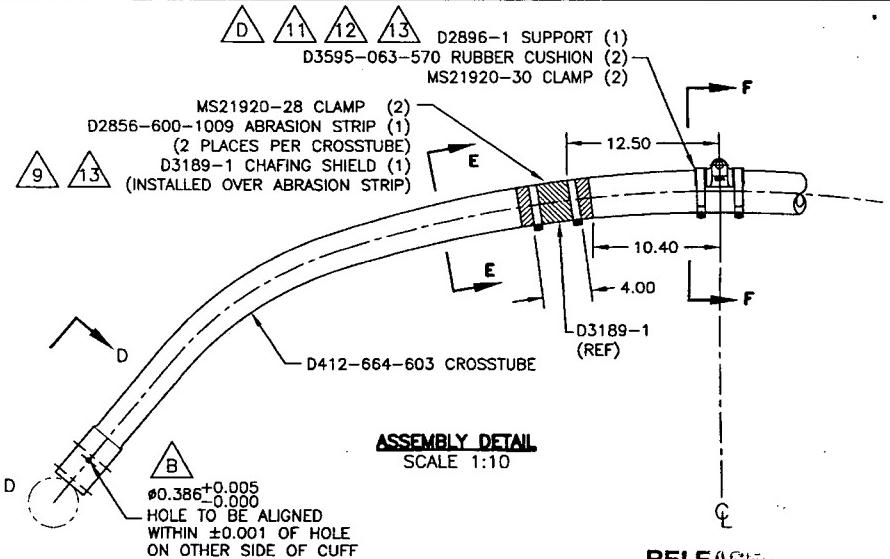
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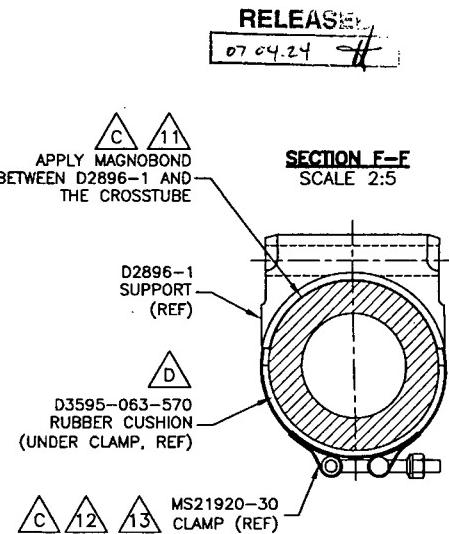
**SECTION E-E**

MS21920-28 CLAMP (REF)

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VIEW D-D:  
CUFF DETAIL  
SCALE 2:5

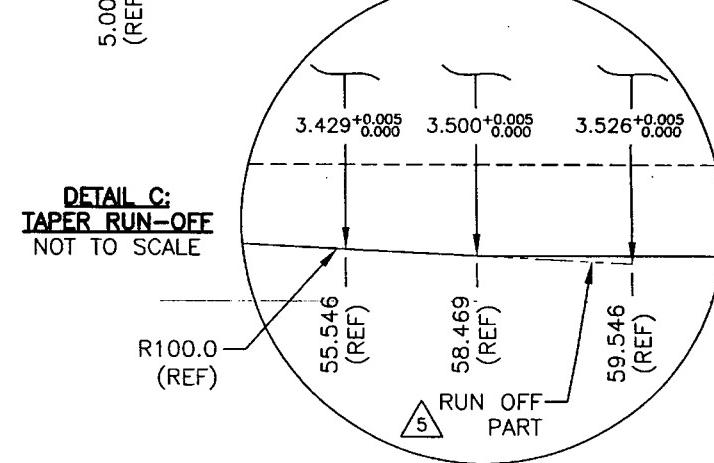
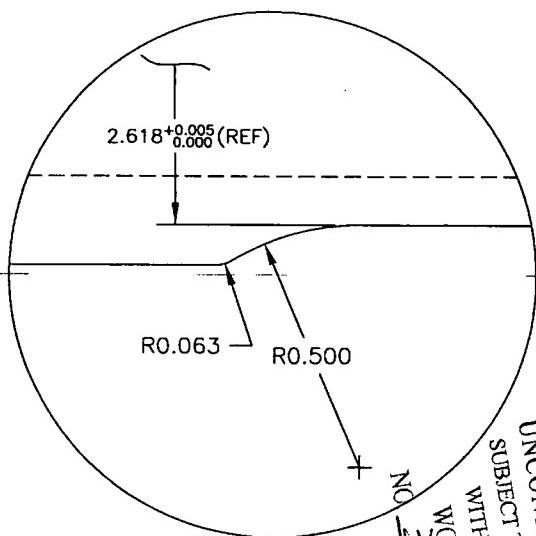
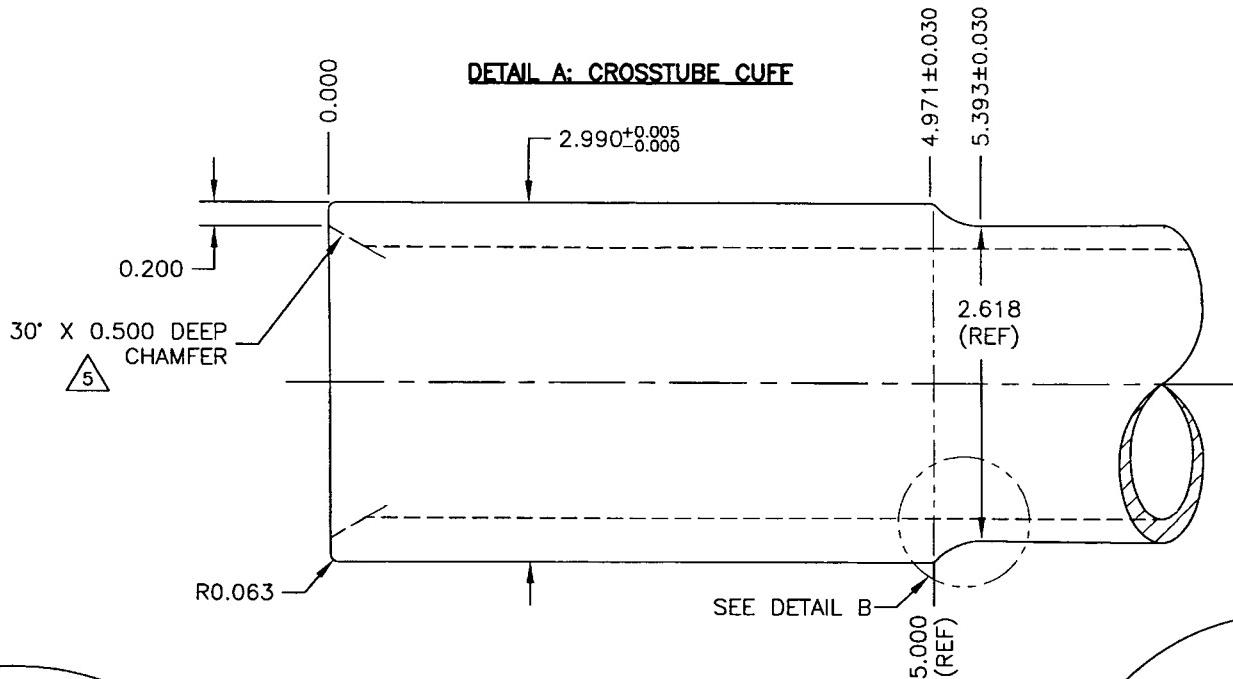


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	CHECKED	APPROVED	DRAWING NO.	REV. D
	9P	H	D412-664-243	SHEET 2 OF 3
	DATE	TITLE		SCALE
07.03.09	CROSSTUBE ASSEMBLY (412 HI AFT)		1:10	

**RELEASED**  
07-04-2449  
PER ECN 889



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PH	PH		REV. D
CHECKED	APPROVED		DRAWING NO.
			D412-664-243
			SCALE
			3 OF 3
DATE			TITLE
07.03.09			CROSSTUBE ASSEMBLY (412 HI AFT)



**ACUREN**

# **LIQUID PENETRANT TEST REPORT**

P - 8-1206

CLIENT	DART AREOSPACE	DATE	JAN. 11, 2008	TIME	AM <input type="checkbox"/>	PM <input checked="" type="checkbox"/>
ATTENTION	LINDA LACELLE	ACUREN JOB NO.	188-8-01206			
ADDRESS	1270 ABERDEEN ST. HAWKESBURY ONT.	PO/WO No.				
		WORK LOCATION	HAWKESBURY			
		ACCEPTANCE STD.	ASTM 1417/QSI-038	REV./DATE	2005	
PROJECT	HIGH AFT X-TUBE 412, 206B AFT X-TUBE, 206L FWD X-TUBE, 206L AFT X-TUBE					
ITEM(S) EXAMINED	JOBS #36061, 36062, 36371, 36372, 36374, 36375, 36376, 36378, 36380, 36382					

JOB DESCRIPTION	PROCEDURE NO. LT-0002 REV./DATE	TECHNIQUE NO. LT-0002-02 REV./DATE
Part No.	D206667201 , D206667103 , D412664203 , D206667203	Material ALODYNED ALUMINUM Thickness
Scope	WET FLOURESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON 100% OF EXTERNAL SURFACE.	

**TEST DETAILS**

Method	<input checked="" type="checkbox"/> Fluorescent	<input type="checkbox"/> Visible	<input checked="" type="checkbox"/> Water Wash	<input type="checkbox"/> Solvent Removable	<input type="checkbox"/> Post Emulsified
Family Brand	MAGNAFLUX		Black Light S/N	8178	<input checked="" type="checkbox"/> Output > 1000 $\mu$ W/cm <sup>2</sup> <input checked="" type="checkbox"/> Ambient < 2 fc
Penetrant	ZL67	Minimum Dwell time	45	Min.	Lighting Equip. <input checked="" type="checkbox"/> Flashlight <input type="checkbox"/> Troubleshooter <input checked="" type="checkbox"/> Output > 100 fc @ surface
Penetrant Remover	H2O	Minimum Dry time	>10	Min.	Other
Developer	SKDS2	Minimum Dwell time	10	Min.	Light Meter S/N
Developer Type	<input checked="" type="checkbox"/> Non-Aqueous <input type="checkbox"/> Aqueous	<input type="checkbox"/> Dry		Cal Due Date	MAR 08

**TEST SURFACE**

As Ground       As Welded       Machined       Shot Blasted       Clean Bare Metal

**RESULTS-**  METRIC  IMPERIAL

### **Scope of Services**

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## **Standard of Care**

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## **SIGNATURES**

Client Representative	<u>Eric Chagnon</u> print	<u>GR</u> signature	DTR #
Technician (Signature):	<u>                        </u>		Report Reviewed by:
Name (Print):	FREDERICK CHAGNON 1 <sup>st</sup> technician      CGSB Level <u>II</u> SNT Level <u>      </u> CGSB Reg. No <u>10560</u>		Name <u>                        </u> initials <u>                        </u> 2 <sup>nd</sup> technician      CGSB Level <u>      </u> SNT Level <u>      </u> CGSB Reg. No <u>                        </u>

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CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

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## Chris Provencal

---

**From:** Jason Murdoch [jmurdoch@dartaero.com]

**Sent:** January 11, 2008 11:01 AM

**To:** 'Chris Provencal'

**Subject:** NCR D412-664-203 B36062 Dip on tube

Hi Chris, here are my findings:

The 2 dips are located at 42.25" up from the cuff, on the top section of the tube. Where the 2 dips are located, the tube wall thickness, measured using an Ultra sonic measuring device, are 0.515", and 0.508". The wall thickness on the side's at the same location around the tube are 0.505", 0.520", and 0.515 on the underside, opposite to the dips. The O.D at this location is 3.225" horizontal, and 3.16" vertical.

On the opposite side of the tube at 42.25": 12.21"  $\phi$  3.215 O.D

Top wall thickness: 0.522" 0.483"

Side wall thickness: 0.519" & 0.500:

Bottom wall thickness: 0.490"

O.D horizontal: 3.20"

O.D vertical: 3.15

From what I can see, this tube appears to be dimensionally sound, as long as the dips are not a stress concern, and will cause a failure.

Jason Murdoch

**Qc. Coordinator**

jmurdoch@dartaero.com

Nominal thickness = 0.483"

Nominal O.D =  $\phi$  3.215

THICKNESSES ARE OK & O.D WITHIN 6% OF NOMINAL,

TUBE ACCEPTABLE

CP  
08.01.15

52

Date: Thursday, 11/29/2007 11:11:03 AM  
 User: Kim Johnston

## Process Sheet

Customer	CU-DAR001 Dart Helicopters Services			Drawing Name	HIGH AFT X-TUBE 412		
Job Number	36062						
Estimate Number	10559						
P.O. Number	:			Part Number	D412664203		
This Issue	11/29/2007	S.O. No.	:	Drawing Number	D412-664-243 REV D		
Prsht Rev.	NC			Project Number	N/A		
First Issue	/ /	Type	LANDING GEAR	Drawing Revision	D		
Previous Run	36061			Material	:		
Written By	:	<i>DD/29/11/29</i>			Due Date	12/24/2007	
Checked & Approved By	<i>DD/29/11/29</i>			Qty:	1	Um:	Each
Comment	Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM						

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :	
1.0	DC	DOCUMENT CONTROL	
		Comment: DOCUMENT CONTROL Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006	
2.0	D6009129	Crosstube Material	
		Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s) Pick: Qty Part number Description Batch 1 D6009-129 Crosstube _____ Check OD = 3.500"; ID = 2.250"	
3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE	
		Comment: MORI SEIKI CNC LATHE LARGE  1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166 2-Turn first side as per Folio FA166 3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243.	<i>REFERENCE ONLY</i>
4.0	QC1	INSPECT ALL DIM TO DIM SHEET	
		Comment: INSPECT ALL DIM TO DIM SHEET	